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FIELD EXPERIMENTS.

CONTENTS.

PAGE

Variety test of oats.......................... 25

High vs. modified ridge for potato growing in Aroostook County.................................. 29

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BULLETIN NO. 188*

FIELD EXPERIMENTS.

Reported by Charles D. Woods.

VARIETY TEST OF OATS, 1910.

According to the Yearbook of the U. S. Department of Agriculture the oat crop in the State of Maine for 1909 amounted to 4,558,000 bushels. The value of this crop on December 1, 1909, is given as $2,661,000. Only two other crops, (potatoes and hay) exceeded oats in the total amount of wealth produced in the State. Nevertheless it is clear that the majority of the farmers in the State devote but little attention to oats as a grain crop. It is seldom that one finds a farmer who plants more than a few acres and these are often cut green and used for hay. Yet the ease with which the oat crop can be seeded, its resistance to late frosts, its adaptability to our climate and soil conditions and the high price which the grain brings in the eastern market, recommend it as a profitable crop. More attention to cultural methods and to seed selection are practically certain to yield greatly increased returns with this crop.

On account of the importance of this crop to the farmers of the State, the Experiment Station has long desired to undertake some experiments relating to better methods of culture than those usually practiced and better seed. The acquisition of Highmoor Farm for experimental purposes made it possible to start some of this work in 1910.

Many of the poor yields of oats are due to poor seed. For this reason it is proposed to undertake some breeding or seed improvement work with oats. The aim of this work will be to obtain varieties which are better adapted to our conditions and which will yield a greater number of bushels per acre.

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* Experiments on top dressing mowing land and the effect of differcut methods of culture of potatoes were begun in 1910. These will be reported when completed.

As a preliminary to definite breeding operations it is necessary to determine some of the varieties which are best suited to Maine conditions. Accordingly during the past season a number of varieties have been tested. Thirty-one plots were planted, each containing one-tenth of an acre. Twenty-five different varieties were used. In the case of the Kherson, Regenerated Swedish Select and Banner oats two or more plots were planted with the same variety. In these cases, however, each plot represented seed from a different source (cf. Table p. 27). The land selected for the test was to all appearances very uniform. It was a light sandy loam soil sloping gradually towards the east. The land had been summer fallowed the year before to kill out the witch grass. It was disked twice in the spring before the oats were sown. This gave an excellent seed bed. The grain was put in with a disk grain drill and sown at the rate of 2 bushels (by measure) per acre. Commercial fertilizer carrying 3.3 per cent of nitrogen, 10 per cent available phosphoric acid and 7 per cent potash was applied at the rate of 300 pounds per acre. The field was rolled after the grain was sown. Notes were taken on each plot during the growing season. The grain from each plot was cut and threshed separately.

Before planting the seed oats were given the formaldehyde treatment for smut. As a consequence the entire field was free from smut, except for one small patch in one of the plots, where some untreated seed was planted by hand to fill out. Here smut appeared. It is impossible to give accurate figures regarding the matter but the annual loss to the State from oat smut must be large. This loss is entirely preventable. One needs only to treat the oats with a weak solution of formaldehyde before planting. Full directions for carrying out this treatment have been published by the Station as a circular bearing the title "Oat Smut and Its Prevention." A copy of this will be sent to any resident of Maine upon application to the Director of the Station. The treatment is simple and easy of application, and costs almost nothing. One pint of commercial formaldehyde should cost not to exceed 20 cents anywhere in the State, and it will treat 50 bushels of seed.

Table Showing Varieties of Oats, Sources of Seed and Yields Per Plot and Per Acre.

Plot number.	VARIETY NAME.	PURCHASED FROM	Pounds of straw from 1-10 acre.	Pounds of grain from 1-10 acre.	Calculated bushels per acre	Color of grain.	REMARKS.
1	Danish Island.....	W. A. Burpee, Philadelphia, Pa........	235.25	149.25	46.6	White .	Late in maturing.
2	Burpee's Welcome	W. A. Burpee, Philadelphia, Pa.........	231.75	181.25	56 6	White .	
3	White Tartar King	W. A. Burpee, Philadelphia, Pa.........	260.75	185.25	57.9	White .	Closed head.
4	Tartar King.......	J. Levasseur, Tessierville, Quebec.....	297.50	215.50	67.3	White .	
5	Black Tartarian...	Iowa Seed Co., Des Moines, Iowa........	263.50	211.50	66.1	Black..	Closed head.
6	Kherson (Univ. No. 1)....	Griswold Seed Co., Lincoln, Nebr..........	250.25	222.25	69.4	Yellow.	Early.
7	Kherson...........	Iowa Seed Co., Des Moines, Iowa..	234.00	203.50	63.6	Yellow.	Early.
8	Irish Victor.......	Iowa Seed Co., Des Moines, Iowa........	312.00*	225.50	70.5	White .	
9	Early Champion..	Iowa Seed Co., Des Moines, Iowa........	264.50	211.50	66.1	White .	Early.
10	Prosperity.........	Iowa Seed Co., Des Moines, Iowa........	287.50	209.50	65.5	White .	
11	Silver Mine........	Iowa Seed Co., Des Moines, Iowa........	278 00	227.00	71.0	White .	
12	Lincoln............	Iowa Seed Co., Des Moines, Iowa........	299.00	224.00	70.0	White .	
13	Regenerated Swedish Select..	Garton-Cooper Co., Chicago, Ill..............	284.25	230.75	72.1	White .	
14	Regenerated Swedish Select..	Griswold Seed Co., Lincoln, Nebr...........	279.50	222.50	69 5	White .	
15	Regenerated Swedish Select..	L. L. Olds Co., Madison, Wis............	280 00	234.50	73.3	White .	
16	Swedish Select....	L. L. Olds Co., Madison, Wis............	245.25	209.75	65.5	White .	
17	President..........	Garton-Cooper Co., Chicago, Ill..............	261.75	218.25	68.2	White .	
18	Senator	Garton-Cooper Co., Chicago, Ill..............	248.75	171.25	53.5	White .	Closed head.
19	Victor	Garton-Cooper Co., Chicago, Ill.........	261.50	190.50	59.5	Black..	
20	Old Island Black..	E. E. Arsenault, Urbinville, P. E. I.......	244.50	178.00	55.6	Black..	Weak straw.
21	White Egyptian...	T. J. Wigginton, Bridgetown, P. E. I......	289.75	181.25	56.6	White .	Closed head.
22	Newmarket........	C. R. Gies, Hidelberg, Ontario......	254.00	213.50	66.7	White .	
23	Imported Scotch Oats............	H. L. Goltz, Bardsville, Ontario..	243.00	192.00	60.0	Yellow.	Early.
24	Early Blossom.....	D. Innes, Tobique River, N. B.....	286.25	178.75	55.8	White .	Closed head.
25	Unnamed White, Maine grown....	Geo. B. Haskell Co., Lewiston, Me............	222.25	193.25	60.4	White .	Mixed varieties.
26	Banner	W. H. Pawsen, Cooldale, Alberta........	248.50	226.50	70.8	White .	
27	Banner............	Geo. Boyce, Meridale, Ontario.......	254.50	208.00	65.0	White .	
28	Banner...... ...	W. M. Black, Creelman, Saskatchewan	253.50	221.50	69.2	White .	
29	Banner............	W. E. Palmer, Scotch Lake, N. B.......	245.25	206.75	64.6	White .	
30	Ligowo............	D. Carmicheel, West Lorne, Ont.........	277.50	212.50	66.4	White .	
31	Unnamed White, Maine grown...	Prof. G. H. Hamlin, Orono, Me..............	242.75	210.25	65.7	Mixed .	Mixed, early and late.
	Averages..................		262.48	205.35	64.2		

* Straw a little damp when weighed.

The table on the preceding page gives for each plot the name of the variety, the source of the seed, the number of pounds of straw obtained from each, the number of pounds of grain and the calculated yield per acre. Data relating to color of the grain and the time of maturity are also given. The weights of the grain and straw were obtained at the time of threshing and before the grain had been recleaned. The number of bushels per acre are calculated on the basis of 32 pounds to the bushel. The seed for Plot Nos. 4, 20, 21, 22, 23, 24, 26, 27, 28, 29 and 31 was purchased from members of the Canadian Seed Growers Association.

SUMMARY.

From this table the following points are to be noted:

1. The average yield over the whole piece was at the rate of 64.2 bushels to the acre. This can only be regarded as very satisfactory when it is remembered that for the State as a whole the average yield of oats per acre in 1909 (Yearbook U. S. Dept. Agr.) was but 37.0 bushels. In the same year the state showing the highest average yield per acre was Montana with 51.3 bushels. The high yield obtained in the experiments here reported shows what it is possible to do under average Maine conditions with proper attention to quality of seed and cultural conditions.

2. The highest yielding variety in the test was Regenerated Swedish Select, with an average of 3 plots at the rate of 71.6 bushels to the acre. The highest yielding single plot was No. 15, the Regenerated Swedish Select plot planted with seed from Wisconsin. There was, however, no significant difference between this plot and No. 13 planted with Garton-Cooper seed.

3. The plot yielding at the lowest rate was No. 1, the Danish Island oats, with 46.6 bushels to the acre. This was an end plot, and probably does not represent the relative worth of this variety. Taking the yield as it stands, however, it is nearly 10 bushels (exactly 9.6) *more* to the acre than the general average for the State in 1909.

4. The Kherson oats, which are so popular in certain parts of the West, yielded very well in this test, somewhat contrary to expectation. They are a small oat but with a relatively low percentage of hull, which enhances the feeding value.

5. The Senator oats (Plot No. 18) made a very rank growth in the field, and were to the casual observer before threshing the best in the test. The straw was heavy, the leaves broad, and the grains very large and plump. Because of the large percentage of hull, however, this variety proved upon threshing to be next to the lowest in rate of yield of all those in the test.

6. From the table it appears that but one plot (No. 1) yielded at a rate lower than 50 bushels per acre. Six plots out of the 31 (Nos. 8, 11, 12, 13, 15 and 26) yielded at the rate of 70 or more bushels to the acre.

7. It is of some interest to examine the yields of the 4 plats of Banner oats, because the seed from which they were planted represents such a wide geographical range. It was thought at the outstart that the New Brunswick seed (Plat 29) would be likely to give a better yield than seed of the same variety from the far west. The climatic conditions in New Brunswick are very similar to those obtaining in Maine. As a matter of fact, however, the two plats planted from seed from the Canadian Northwest (No. 26, Cooldale, Alberta, and No. 28, Creelman, Saskatchewan) each produced at the rate of about 5 bushels more per acre than plot No. 29 from New Brunswick seed.

It is to be understood that these statements are simply based upon the experience in 1910. They are not offered as definite conclusions regarding the relative merits of the varieties concerned. To reach such conclusions it is necessary to conduct such variety tests over a period of years. It is expected that these experiments with oats will be continued in 1911.

High Riidge vs. Modified Ridge Culture for Potato Growing in Aroostook County.

The method of ridge culture is almost universally used by potato growers in Aroostook County. Probably over 90 per cent of the farmers practice what might be called extreme ridge culture. The ridging begins at the time of planting. The planter most used has a plow so constructed that it makes little more than a mark on the soil unless it is very light, instead of a furrow, then the disks at the rear of the machine cover the seed by throwing up a ridge perhaps 4 inches high so that the seed at the very start is practically on a level with the surface between the rows. A few farmers make a practice of going over the field with a weeder and somewhat flattening the ridge but the number that do this is comparatively few. The method most usually followed is to go between the rows with the cultivator perhaps 8 to 10 days after the potatoes are planted and then as soon as they begin to break the ground go over with the horse-hoe and bury them up also burying the weeds at the same time and thereby raising the height of the ridge. This kind of cultivation is continued until the tops are too large to pass through without injury. By this time an A shaped ridge has been formed about 12 to 15 inches high and, of course, the surface between the rows has been dropped by the continual scraping up of the soil so that the tubers growing in the ridge are considerably above the surface between the rows.

It can readily be seen that in a dry season a field so handled must suffer considerably from lack of moisture. Of course, in a wet season as is frequently experienced in Aroostook County no lack of moisture is felt and the drains between the rows are an advantage rather than an injury, but in an extremely dry season it would seem that the drainage is too great. The ridges being high and narrow dry out very quickly and it would appear therefore the crop must suffer more from lack of moisture than it would if the roots of the plants were below the level as they are when modified level culture is practiced.

The two dry seasons of 1905 and 1906 were somewhat disastrous to potato fields cultivated with the high ridge and the crop was considerably below a normal crop in the dry sections of the county. For this reason experiments were undertaken in 1907 for the purpose of comparing a more nearly level culture such as is practiced in southern New England and some dryer sections of the country with the ridge method common in Aroostook County.

Mr. Oscar D. Benn, who lives a short distance out of Houlton, has practiced a modification of a ridge and level culture for several years and reports it as successful. He plants the seed as deep as possible with a Robbins planter and keeps the field free from weeds by frequently going over it with the weeder, in three different directions—crosswise, lengthwise and diagonally. In this way he claims to keep the weeds down during the first stages of growth without injury to the plants more cheaply than he can by the ridge method. The weeder is used until the plants get too high for a weeder, then the cultivator is run between the rows until the plants are 8 to 9 inches high. At this time the horse hoe is used to throw up a low ridge which is broader and flatter on the top than the ordinary ridge and is not more than half as high. The horse hoe is used only once and this is usually the final hoeing of the field. Mr. Benn claims that the potatoes are more easily taken care of by this method; more easily harvested, and in a season that is at all dry, better crops are obtained than by the method of ridging.

EXPERIMENT IN 1907.

The season of 1907 proved an extremely wet one and unfavorable for this experiment so that the modified method of ridge culture could not be strictly followed. Six acres on the farm of Mr. John Watson, Houlton, were given to the experiment, three acres being used alternately for the modified ridge and three check plots were cultivated by the method of high ridge.

The yield on plot 2 is much below the others but this was apparently not due to the method of culture but to the soil. There was a strip of several rods on the upper part of this lot where the tubers were very scabby and only a light yield was obtained. This condition extended slightly into plot 3 reducing the yield of that plot somewhat but not nearly to such an extent as on plot 2. For this reason in the comparison plot 2 is omitted.

Yield of Merchantable Potatoes Per Acre. 1907.

Plot 1 Full ridge.	Plot 2 Modified ridge.	Plot 3 Full ridge.	Plot 4 Modified ridge.	Plot 5 Full ridge.	Plot 6 Modified ridge.
366 bushels	231 bushels	297 bushels	308 bushels	312 bushels	355 bushels

Average for full ridge culture..325 bushels.
Average for modified ridge culture, plots 4 and 6...................................333 bushels.

EXPERIMENT IN 1908.

For the modified culture experiment this year 90 rows, nearly three acres, were planted on new land on the northwest part of Mr. John Watson's farm in Houlton. The plan of planting in a solid piece instead of in strips as in 1907 was adopted for convenience in cultivating early in the season when it is desirable to run the weeder and smoothing harrow crosswise to keep down the weeds.

While July was rather dry for the high ridge culture, the potatoes did not appear to suffer much from the drought. Abundant rains early in August insured the crop. The yields were as follows:

Yield Merchantable Potatoes 1908.

Full ridge check plot*	314	bushels.
Modified ridge, 3 acres	902	"
Full ridge check plot	268	"
Average for check plots	291	"
Average modified culture plots	301	"

EXPERIMENT IN 1909.

This year about three acres were selected for the experiment of fairly uniform land which was in grass the preceding year. Other than part of the field carried a good deal of witch grass it proved to be a good piece for the purpose. Two acres of the middle section of the piece were taken for the low ridge culture and a half acre on each side were planted to check plots and given the high ridge culture.

The spring proved to be cold and wet and the field was not planted until May 31. The whole season had abundant rainfall even too abundant for the high ridge culture during the season. Because of the continued cold and wet the potatoes did not break through the ground until June 18. The potatoes were so late planted and so slow to come up that the vines were still very green and tender when the first frost came early in September. On this account the yields were very materially reduced. They were as follows:

Yield of Merchantable Potatoes 1909.

Full ridge per acre, average two plots	204	bushels.
Modified ridge, per acre	216	"

The average for the three years was

Low ridge culture	273 bushels per acre.
Modified ridge culture	283 bushels per acre.

In these three years there were, therefore, practically nothing to choose between the two methods so far as the yield was concerned in Aroostook County.

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*The plots were strictly comparable as to area but were a little less than an acre each.